

HANDBOOK OF
OPERATING INSTRUCTIONS

for

RADIO SET
AN/CRN-2

34.7

RESTRICTED
(For Official Use Only)

TO BE REVISED TO INCLUDE SCHEMATIC DIAGRAM
Wells 5 Sept.

★
Approved 16 JUNE 1944



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AN 08-30CRN-2

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Destruction of Abandoned Materiel in the Combat Zone

In case it should become necessary to prevent the capture of this equipment and when ordered to do so, DESTROY IT SO THAT NO PART OF IT CAN BE SALVAGED, RECOGNIZED, OR USED BY THE ENEMY. BURN ALL PAPERS AND BOOKS.

Means:—

1. Explosives, when provided.
2. Hammers, axes, sledges, machetes, or whatever heavy object is readily available.
3. Burning by means of incendiaries such as gasoline, oil, paper, or wood.
4. Grenades and shots from available arms.
5. Burying all debris or disposing of it in streams or other bodies of water, where possible and when time permits.

Procedure:—

1. Obliterate all identifying marks. Destroy nameplates and circuit labels.
2. Demolish all panels, castings, switch- and instrument-boards.
3. Destroy all controls, switches, relays, connections, and meters.
4. Rip out all wiring and cut interconnections of electrical equipment. Smash gas, oil, and water-cooling systems in gas-engine generators, etc.
5. Smash every electrical or mechanical part, whether rotating, moving, or fixed.
6. Break up all operating instruments such as keys, phones, microphones, etc.
7. Destroy all classes of carrying cases, straps, containers, etc.
8. Bury or scatter all debris.

DESTROY EVERYTHING!



Unsatisfactory Report

For U. S. Army Air Force Personnel:

In the event of malfunctioning, unsatisfactory design, or unsatisfactory installation of any of the component units of this equipment, or if the material contained in this book is considered inadequate or erroneous, an Unsatisfactory Report, AAF Form No. 54, or a report in similar form, shall be submitted in accordance with the provisions of Army Air Force Regulation No. 15-54, listing:

1. Station and organization.
2. Nameplate data (type number or complete nomenclature if nameplate is not attached to the equipment).
3. Date and nature of failure.
4. Airplane model and serial number.
5. Remedy used or proposed to prevent recurrence.
6. Handbook errors or inadequacies, if applicable.

For U. S. Navy Personnel:

Report of failure of any part of this equipment during its guaranteed life shall be made on Form N. Aer. 4112, "Report of Unsatisfactory or Defective Material," or a report in similar form, and forwarded in accordance with the latest instructions of the Bureau of Aeronautics. In addition to other distribution required, one copy shall be furnished to the inspector of Naval Materiel (location to be specified) and the Bureau of Ships. Such reports of failure shall include:

1. Reporting activity.
2. Nameplate data.
3. Date placed in service.
4. Part which failed.
5. Nature and cause of failure.
6. Replacement needed (yes—no).
7. Remedy used or proposed to prevent recurrence.

For British Personnel:

Form 1022 procedure shall be used when reporting failure of radio equipment.

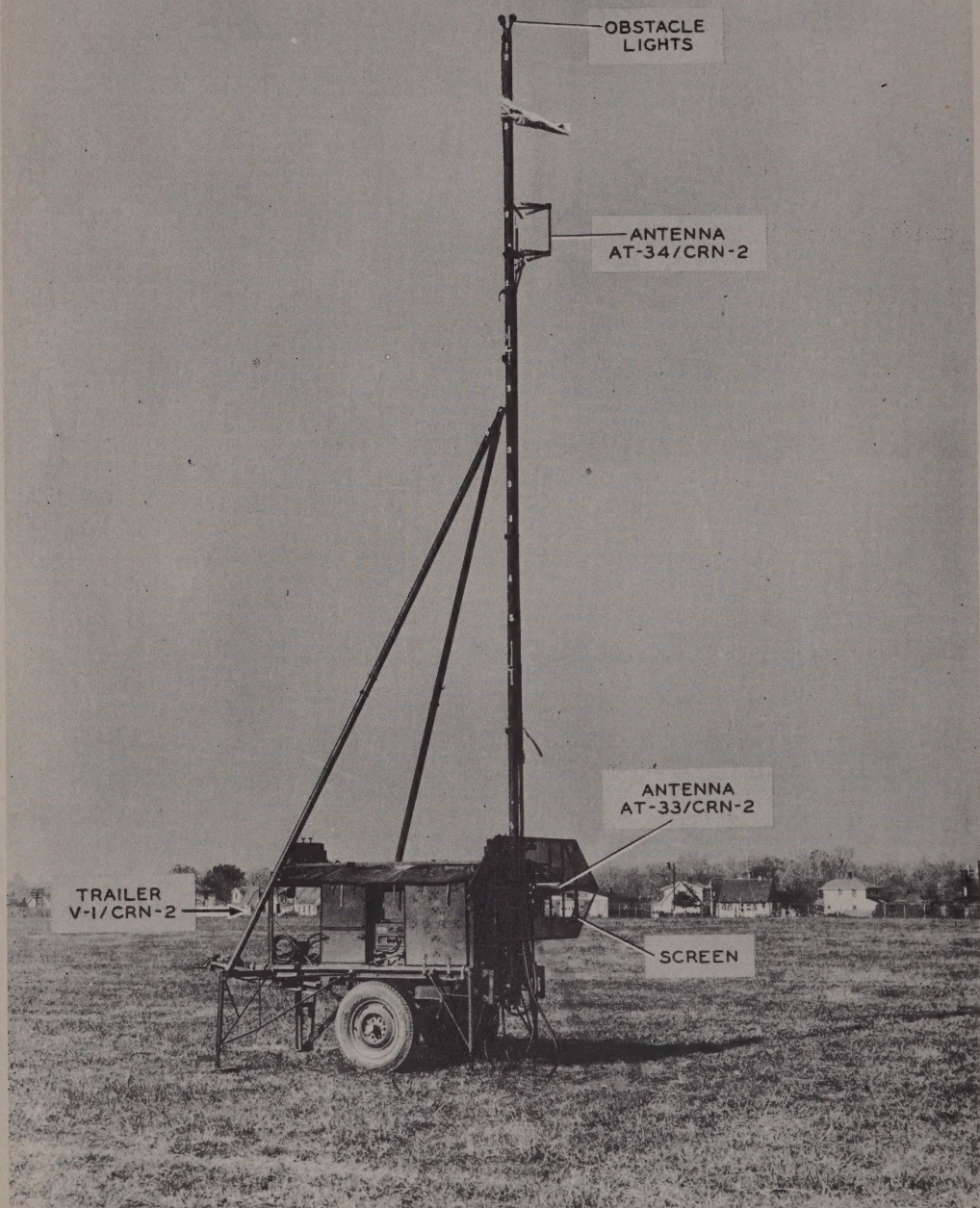


Figure 1-1. Radio Set AN/CRN-2—Set Up For Operation

SECTION I GENERAL DESCRIPTION

1. GENERAL.

a. PURPOSE. — Radio Set AN/CRN-2, part of the Army Air Forces Instrument Approach System, formerly known as Instrument-Landing System SCS-51-(*), is essentially a radio transmitter and a radio-frequency radiating system. It provides vertical guidance to an aircraft coming in for a landing on a localizer course. The radio set, contained in Trailer V-1/CRN-2, is entirely portable. (See fig. 1-1.) It uses Radio Set SCR-610-A, a major component, for intercommunication between associated equipments of the instrument-approach system.

b. FREQUENCY.—Radio Set AN/CRN-2 is designed to operate at a frequency of 329 to 335 megacycles. Initial equipments are issued for operation on 335 megacycles only.

c. POWER SOURCES.—The 115-volt 60-cycle supply necessary to operate Radio Set AN/CRN-2 can be obtained from the following:

- A gasoline engine-driven generator,
- A 115-volt 60-cycle source,

A 115-volt 50-cycle source through a frequency changer,

A 230-volt 50-cycle source through a frequency changer, or

A 230-volt 60-cycle source.

d. POWER CONSUMPTION AND OUTPUT.

(1) **POWER INPUT.** — During operation, the power delivered by the generator to the transmitting equipment is approximately 750 watts at a potential of 115 volts and at a frequency of 60 cycles-per-second. The total 50-cycle power consumption when using Motor Generator PU-15/CRN-2 is 1350 watts.

(2) **POWER OUTPUT.** — Maximum radio-frequency output of the transmitter section of Radio Transmitter T-3/CRN-2 is 20 watts. However, the radio-frequency carrier, after having been totally amplitude-modulated by the modulator section of Radio Transmitter T-3/CRN-2, has an average power of approximately 5 watts.

2. EQUIPMENT SUPPLIED.

The table below lists the equipment supplied with the radio set.

Quantity	Name of Unit	Dimensions	Weight† (lbs.)
1	Radio Transmitter T-3/CRN-2	3' 3" x 2' 1" x 2'	227
1	Rectifier Power Unit PP-29/CRN-2	26 ³ / ₈ " x 22 ³ / ₈ " x 24 ³ / ₈ "	254
1	Antenna System AS-2/CRN-2 including:		
	1 Antenna AT-34/CRN-2	1' 10 ¹ / ₂ " x 1' 9 ¹ / ₄ " x 1' 4"	7
	1 Antenna AT-33/CRN-2	1' 8" x 9" x 11"	6
	1 Antenna Reflector AT-35/CRN-2	8' 3" x 2' 7" x 11"	3.6
1	Cord CG-22/CRN-2	26' 10"	11 ¹ / ₄ (0.4/ft.)
1	Cord CG-21/CRN-2	7' 6"	4 ¹ / ₂ (0.4/ft.)
1	Cord CG-19/CRN-2	25' 9"	3 (0.1/ft.)
1	Cord CG-20/CRN-2	6' 4"	1 (0.1/ft.)
2	Guy Section AB-10/CRN-2	8' 6" x 2 ¹ / ₂ " diameter	12
2	Guy Section AB-11/CRN-2	8' 7 ¹ / ₂ " long x 4" diameter including projections	15
1	Mast Assembly including:		
	1 Mast Section AB-12/CRN-2	8' 7 ¹ / ₂ " long x 4" diameter	14
	1 Mast Section AB-13/CRN-2	9' 3" long x 3 ¹ / ₂ " diameter	21
	1 Mast Section AB-14/CRN-2	8" overall diameter including projections	
		9' 9" long x 4 ¹ / ₂ " diameter with projections	20

*Any Production Is Applicable.

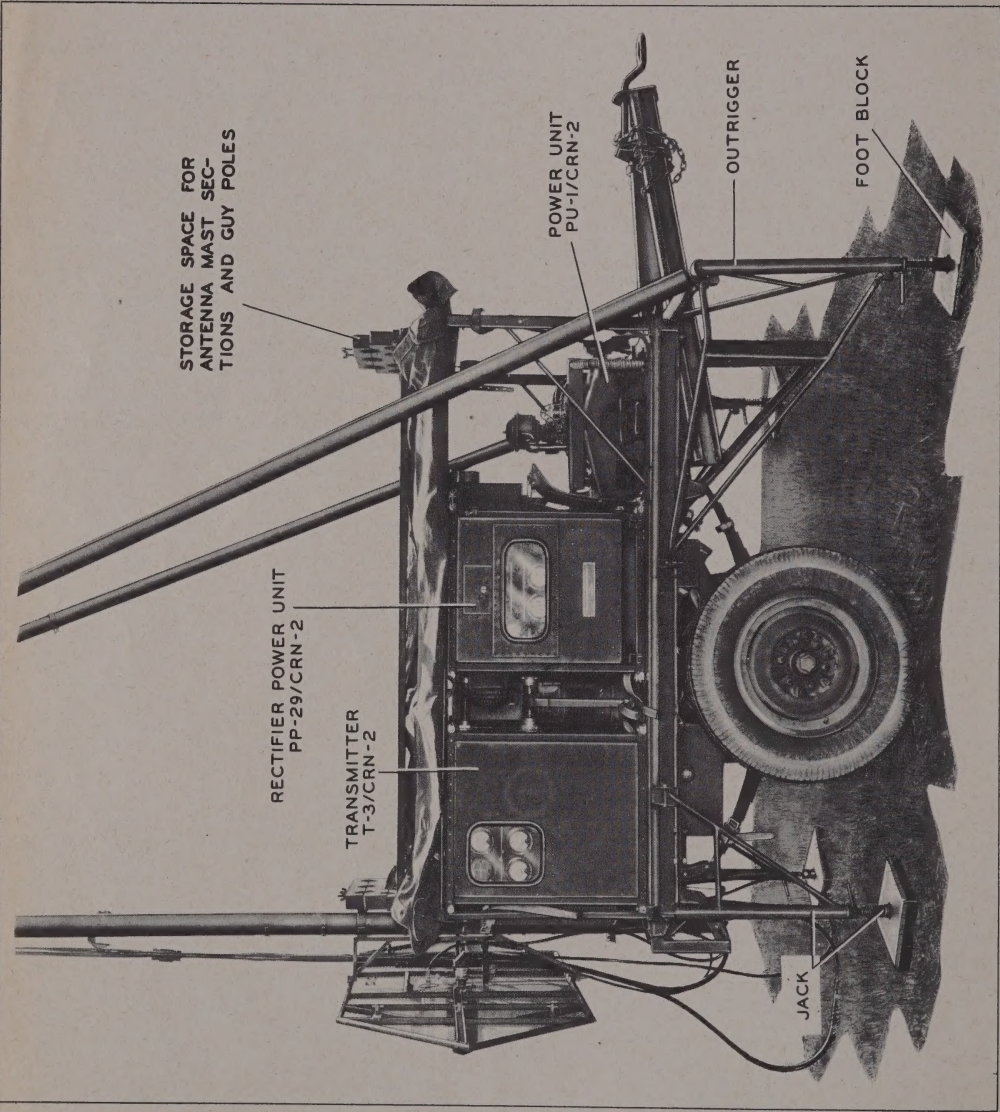


Figure 1-2. Radio Set AN/CRN-2—Transmitter Side

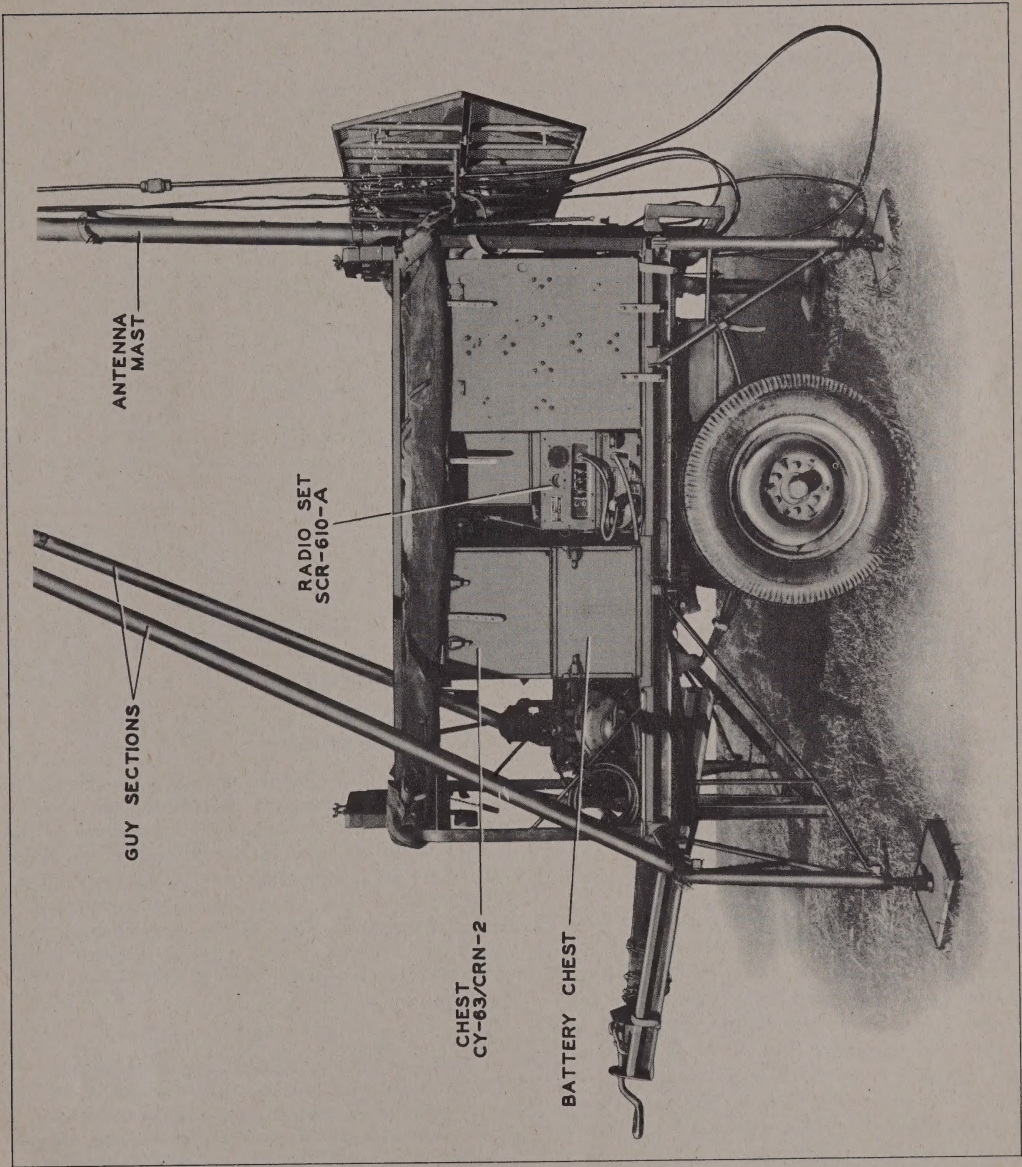


Figure 1-3. Radio Set AN/CRN-2—Radio-Phone Side

Quantity	Name of Unit	Dimensions	Weight† (lbs.)
	1 Obstruction Light Unit MX-42/CRN-2, with Cord attached	6" x 10" x 4" 26' 10" (cord only)	5¼ 1¾ (0.06/ft.)
1	Power Unit PU-1/CRN-2	21¾" x 31' x 16"	226
2	Battery BB-57	1' 4" x 7" x 9½"	62
1	Motor Generator PU-15/CRN-2‡		
1	Auto-Transformer MX-95/CRN-2	10" x 8" x 7½"	48
1	Radio Set SCR-610-A	1' 1" x 1' 5" x 1' 1"	70
1	Voltmeter TS-40/CRN-2	12" x 5" x 4"	2¾
1	Chest CY-63/CRN-2	1' 5" x 1' 4" x 1' 3"	77 (full) 36 (empty)
1	Trailer V-1/CRN-2	5' x 10' 3" x 5' 2" (with Hitch) 5' x 6' 6" x 5' 2"	1033
1	Tarpaulin	8' 2" x 11' 5" x 1⅛"	18
1	Compass Assembly Type B-16	4½" x 3½" x 4½"	1½
1	Fire Extinguisher Type A-2	3" diameter x 13½"	6
1	Shovel LC-19	3' x 9" x 4"	4
1	Kerosene Lantern	1' 2½" x 6" diameter	7
1	Test Set I-77-()**	5¼" x 2" x 3"	1¾
1	Battery BA-42		

†The total weight of the complete Radio Set AN/CRN-2 is 2190 pounds.

‡Supplied only when there is a 50-cycle power.

**Any production is applicable.

SECTION II

INSTALLATION AND ADJUSTMENT

1. GENERAL.

Installation of Radio Set AN/CRN-2 involves selection of a site, selection of a glide angle, and positioning and setting up the equipment.

2. PRE-INSTALLATION.

a. BATTERY BB-57.—This battery for Power Unit PU-1/CRN-2 is supplied dry with the electrolyte for it supplied in a separate container. Before using the equipment, pour the electrolyte in the battery and let it stand for at least eight hours. Then charge the battery at 12 amperes for a period of from 36 to 48 hours, or until the specific gravity no longer changes. Never charge or discharge batteries when electrolyte temperature is above 120°F (49°C). An electrolyte thermometer is stored in the battery compartment.

b. SILICA GEL DESSICATOR.—This dessicator is found in the spare-parts box. Remove its protective cover and install the dessicator in the rear of the monitor unit compartment.

3. SELECTION OF SITE.

In selecting a site, factors to be considered are the position of the transmitter relative to the runway, reflecting objects which might affect the shape of the glide path, and the effect of ground contour and slope.

a. POSITION OF RADIO SET AN/CRN-2 RELATIVE TO RUNWAY.—Locate the radio set 700 to 1000 feet from the approach end of the runway and approximately 400 feet to the right or left in a direction perpendicular to the center line of the runway. (See fig. 2-2.)

Note

Normally the aircraft will, upon landing, contact the runway about 300 feet ahead of the transmitter toward the approach end of the runway. This distance will depend upon the height of the aircraft's antenna from the ground and the glide angle. The distance from the point where the aircraft lands to the far end of the runway (the opposite end from the approach end) is the distance in which the airplane must come to a stop. This must be

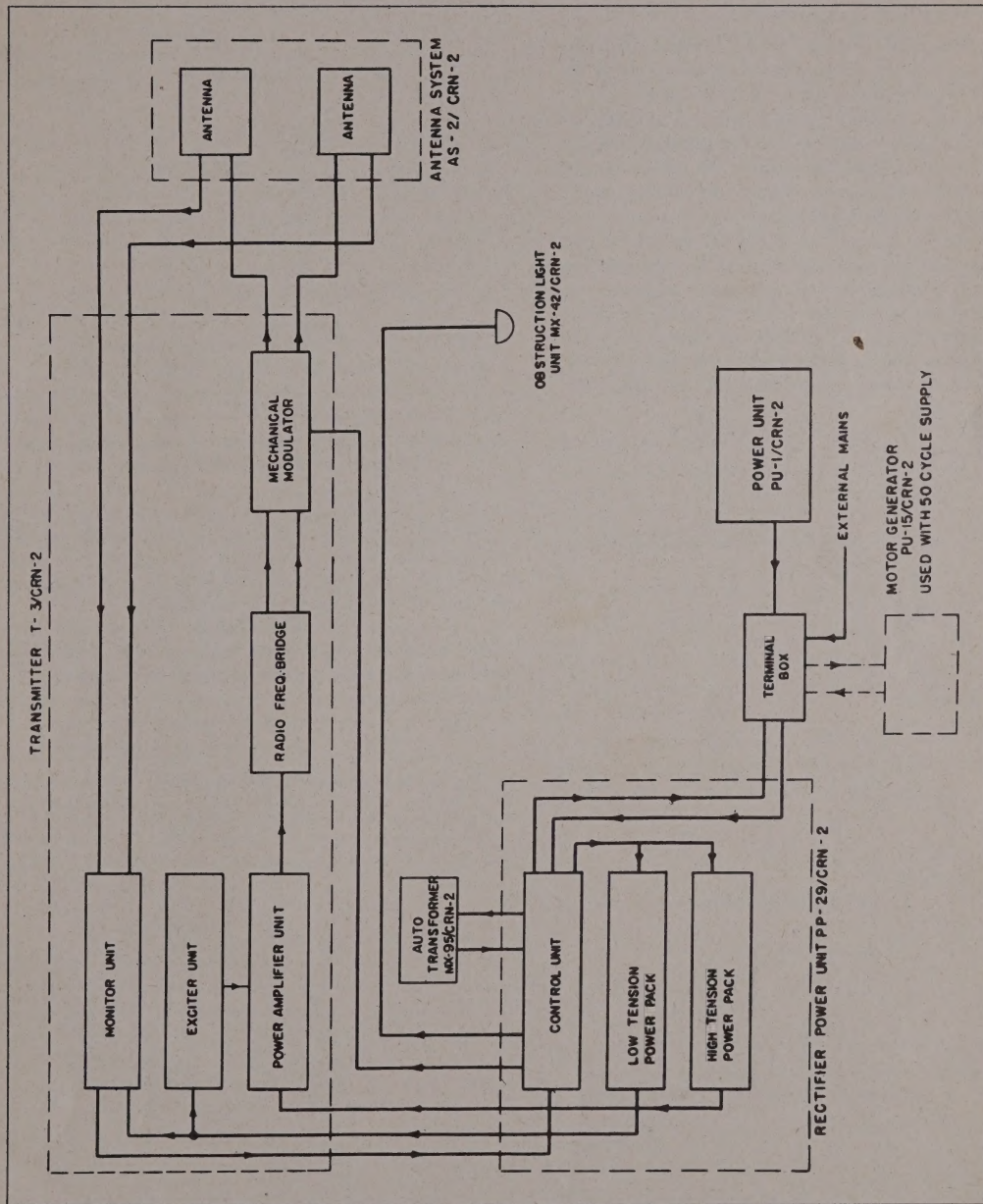


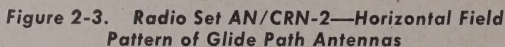
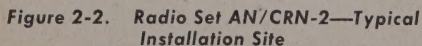
Figure 2-1. Radio Set AN/CRN-2—Block Diagram

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AN 08-30CRN-2

b. REFLECTING OBJECTS.

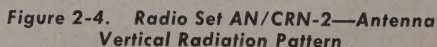
The amount of signal received from the antennas by the reflecting object depends on the distance between it and the transmitting equipment, the height of the object, and the orientation of the transmitting equipment with respect to the object.

c. EFFECTS OF GROUND CONTOUR AND SLOPE.



(2) Figure 2-5 shows a profile view of Radio Set AN/CRN-2 set up at three positions. The following table describes what may be expected under conditions shown:

<i>Position</i>	<i>Glide Path</i>
"1" (At the edge of sharp drop in ground).....	None
"2" (300 feet or less from the edge).....	Uncertain
"3" (More than 300 feet from the edge).....	Normal



(3) Uniformly sloping ground causes a decrease in the glide angle if the ground slopes down from the front of the equipment, and an increase in the angle if the ground rises away from the front of the equipment.

(4) In cases of doubtful ground conditions set up the equipment in the chosen location and make a test flight in good weather to determine whether the course is usable.

4. SELECTION OF GLIDE ANGLE.

a. The glide angle necessary to clear any obstructions off the approach end of the runway will be determined by the height of these obstructions and their distance from the approach end of the runway. The antennas can be so spaced on the antenna mast that they produce glide angles of $2\frac{1}{4}$, $2\frac{1}{2}$, $2\frac{3}{4}$, 3, $3\frac{1}{4}$, $3\frac{1}{2}$, $3\frac{3}{4}$, 4, $4\frac{1}{2}$, or 5 degrees.

b. The minimum glide path needed may be determined from (1) the height of an obstruction above the approach end of the runway, (2) the required clearance of a plane flying over that obstruction, or (3) the distance of the obstruction from the approach end of the runway. (See fig. 3-3.)

c. This information may be obtained either by use of a transit or from maps of the region. After the heights and locations of obstructions have been determined consult the operations officer to determine the required clearance to be maintained over these obstructions.

CAUTION

If in doubt as to the exact height of an obstruction and its exact distance from the approach end of the runway, always use a high glide angle until a flight check shows that a lower glide angle may be used.

5. EXAMPLE OF A TYPICAL INSTALLATION.

Figure 2-2 shows an example of a runway on which Radio Set AN/CRN-2 may be set up. The example below shows how the location of the transmitter is determined.

a. The distance from the approach end of the runway to the obstruction, a range of hills, is 6000 feet; the height above the runway level plus the required clearance is 300 feet. The required glide angle is between $2\frac{3}{4}$ and 3 degrees; therefore a 3-degree glide angle is used. (See fig. 3-3.)

b. Since Radio Set AN/CRN-2 may be used on either side of the runway, there are two possible sites, position "1" and position "2", both 700 to 1000 feet from the approach end of the runway and 400 feet from the center line of the runway. The total length of the runway is 6000 feet and the distance from Radio Set AN/CRN-2 to the far end of the runway is 5000 feet. The estimated distance required for the aircraft to stop is 4000 feet. Position "1" would be the preferred site in this illustration as it is the one most free from obstructions and reflecting objects.

6. POSITIONING AND SETTING UP RADIO SET AN/CRN-2.

a. SETTING UP THE RADIO SET

(1) Line up the equipment so that the rear end is approximately perpendicular to the center line of the runway.

(2) Detach the jacks and outriggers from their locations on the trailer and set them up. (See fig. 1-2.)

(3) Remove the antenna mast sections and the guy poles from their storage place on top of the trailer.

(4) Place these sections and guy poles on the ground and assemble them with clamps and expanding screws. (See fig. 2-6.)

(5) Rest the mast on the trailer and attach the guy poles to the mast and to the outriggers on the trailer. (See fig. 2-7.)

(6) Remove the obstacle light, the screen, the upper antenna, and the lower antenna from their locations above the gasoline-engine generator.

(7) Place the upper antenna on the mast at the desired glide-angle calibration point. (See fig. 1-1.)

(8) Cap the obstacle light onto the tip of the mast and fasten it tight by means of the attached screw.

(9) Connect the antenna cables, found in the storage box in back of the transmitter, to the upper antenna and strap them to the pole *but do not fasten the lower strap at this time.*

(10) Lift the mast at the support and grasp the mast at the lower end pushing the lower end of the mast toward the trailer (See fig. 2-7.) Raise it until it is in position to lower the end into its socket. Close the bottom clamp on the socket.

(11) Fasten the lower mast strap to support the cables, and connect the obstruction-light and upper antenna cables to their proper outlets at the rear of

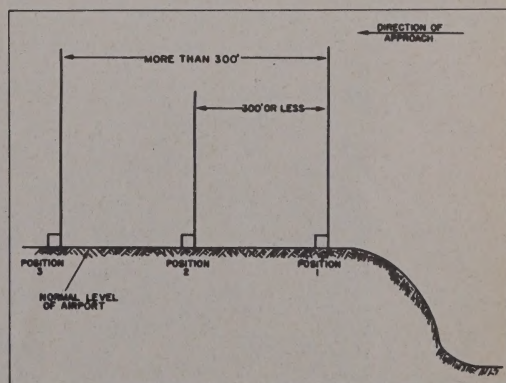


Figure 2-5. Radio Set AN/CRN-2—Profile View of Ground Selection Site

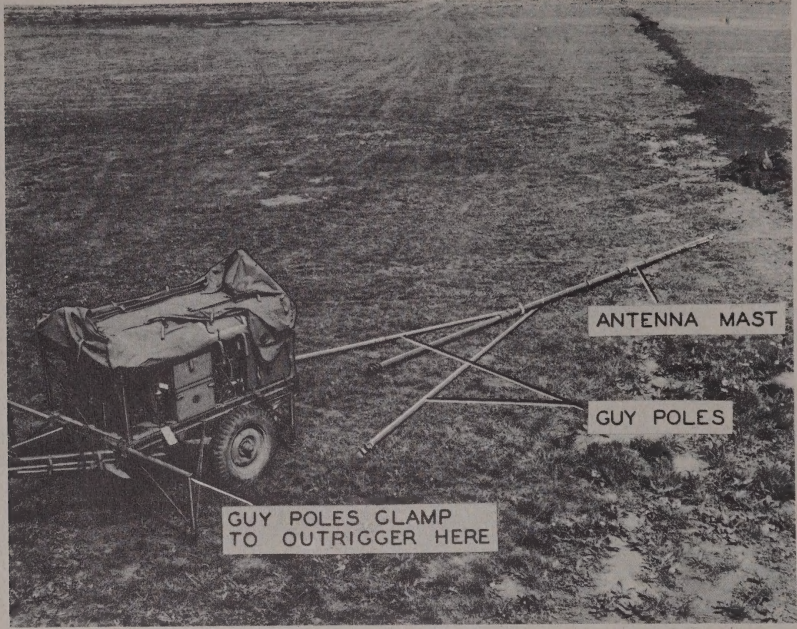


Figure 2-6. Radio Set AN/CRN-2—Antenna Mast and Guy Poles Before Erection

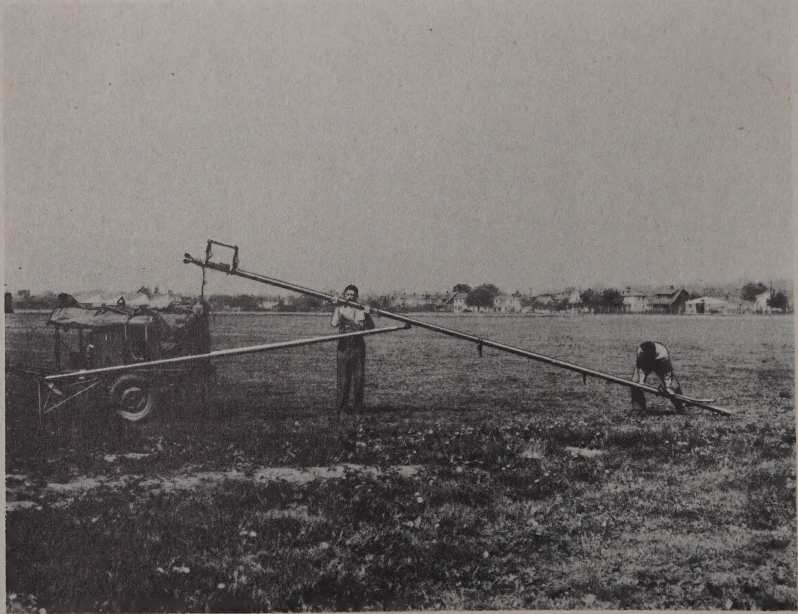


Figure 2-7. Radio Set AN/CRN-2—Erection of Guy Poles and Antenna

the trailer. The obstruction-light line plugs into a socket which is labeled "SOCKET FOR OBSTRUCTION LIGHT" mounted on the trailer beneath the transmitter. The socket for the upper antenna which is located on the trailer in back of the mounted screen, is labeled "SOCKET FOR UPPER ANTENNA CABLE".

(12) Assemble the screen and mount the lower antenna to it. (See fig. 2-8.)

(13) Connect the lower antenna cables to the trailer first and then connect them to their proper position behind the lower antenna screen. Socket for the antenna cable is found on the trailer in back of the mounted screen and labeled "SOCKET FOR LOWER ANTENNA CABLE."

(14) Set the screen into place on the lower mast bracket. (See fig. 2-8.)

(15) Line the entire trailer so that the screen is perpendicular to the runway.

(16) Attach the mast level provided in the spare

parts cabinet to the mast and level the trailer by means of the jack. Use the footblocks, found between the control panel and the transmitter proper, underneath the jacks. (See fig. 1-2.)

b. ADJUSTMENT.

Note

Antennas occupy only paired positions. That is, if one antenna is in a $2\frac{1}{2}$ -degree position the other must also occupy a $2\frac{1}{2}$ -degree position on the mast.

(1) To line up the upper and lower antennas accurately, stand 10 paces in front of the trailer and sight upon the white marks on the lower antenna and screen. (See fig. 2-8.)

(2) Move away from the runway until one of the marks on the lower antenna appears to be exactly in line with the mark on the screen.

(3) Then sight upon the upper antenna and have a

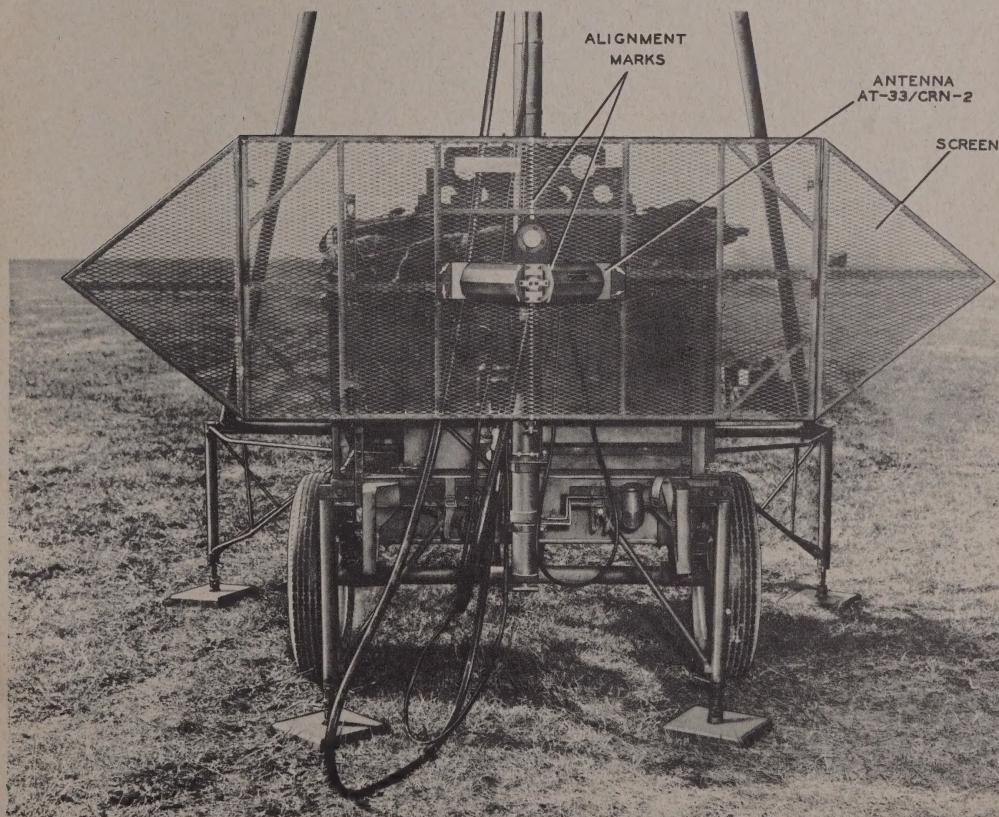


Figure 2-8. Radio Set AN/CRN-2—Antenna Mast End

man rotate the mast by means of the bar at the mast base so that the vertical tube of the top antenna is centered between the white stripes in the rear of the upper antenna.

(4) When this is done, tighten the lower antenna clamps and the wing which fastens the mast bar. The equipment is now ready for operation.

7. INSTALLATION OF RADIO RECEIVER AND TRANSMITTER BC-659(*), PART OF RADIO SET SCR-610-A.

a. Remove Handset TS-13-(*) from Chest CY-63/CRN-2.

b. Check either Plate Supply Unit PE-117-(*) Power Supply Unit PE-120-(*) for proper connection for 12-volt operation.

c. Join the cable connectors of receiver and transmitter to the plate supply unit and tighten securely.

d. Insert plugs of Handset TS-13-(*) into proper jacks on the radio receiver and transmitter panel.

e. Insert Antenna AN-29-C through hole in tarpaulin. Screw into the socket on the rear of the radio receiver and transmitter and pull out the sections to full length.

*Any Production Is Applicable.

SECTION III OPERATION

1. OPERATION OF RADIO SET AN/CRN-2.

If either a 50- or 60-cycle external mains is obtainable at the field use it. If not, operate the equipment using the gasoline engine-driven generator.

a. FOR GASOLINE ENGINE-DRIVEN GENERATOR OPERATION.

(1) Place the "EXTERNAL MAINS - GAS GENERATOR" switch† in the "GAS GENERATOR" position.

(2) Set the "REMOTE OPERATION - LOCAL OPERATION" switch to "LOCAL OPERATION".

Note

Do not start the power unit under load. Make certain that the "TRANSMIT-OFF" switch is in the "OFF" position.

(3) Depress the "START" button on Power Unit PU-1/CRN-2. As this is being done, pull out the choke button, taking care to avoid flooding or having too rich a mixture. Before continuing with the next step, run the power unit until it is warm enough to operate smoothly with the choke button entirely in.

Note

When cold, the choke button must be nearly

†Unless otherwise noted, all switches are found on the panel of Rectifier Power Unit PP-29/CRN-2.

all the way out for the engine to obtain a rich enough mixture. When warm, only light choking is required.

(4) Throw the "FILAMENTS", "PLATE VOLTAGES", and "MODULATOR MOTOR" switches to their "NORMAL" positions. Corresponding panel lights below the switches will go on. No light indicates a fault.

(5) Throw the "MONITOR" switch to "BY PASSED". If the "MON. PL. V." light doesn't go on it indicates a fault.

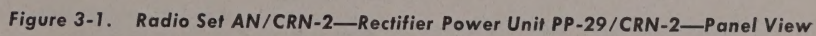
(6) Throw the "TRANSMIT-OFF" switch on the front door of the rectifier power unit to the "TRANSMIT" position.

(7) Remove the front cover of the transmitter cabinet. (See fig. 3-2.)

(8) Meter the various circuits in sequence according to the table below. For example, set the "GRID CURRENT-PLATE VOLTAGE" to position "1". Tune the "JAN-6SJ7 OSC. SCREEN" control for maximum reading on the "GRID C-PLATE V" meter.

Note

All tuning controls and meter switches are labeled. The chart above the meter switches on the "EXCITER PANEL" shows the switch positions for metering various circuits.



TRANSMITTER T-3/CRN-2 TUNING SEQUENCE

"GRID CURRENT-PLATE VOLTAGE" Switch Position	Control	Meter	Reading
1	"JAN-6SJ7 OSC. SCREEN"	"GRID C-PLATE V" meter	250 to 475
1	"JAN-6SJ7 OSC. PLATE"	"GRID C-PLATE V" meter	250 to 475
2	"JAN-6SJ7 DOUBLER PLATE"	"GRID C-PLATE V" meter	250 to 475
3	"JAN-832 TRIP. PLATE"	"GRID C-PLATE V" meter	250 to 450
4	"JAN-829B AMPLIF. PLATE"	"GRID C-PLATE V" meter	250 to 400
5	"JAN-8025 TRIP. GRID"	"GRID C-PLATE V" meter	200 to 350
5	"JAN-8025 TRIP. PLATE"	"GRID C-PLATE V" meter	200 to 350
	"JAN-8025 P.A. PLATE"	"R.F. OUTPUT" meter	35 to 65

(9) Throw the "MONITOR" switch (Rectifier Power Unit PP-29/CRN-2) to the "NORMAL" position and press the "MONITOR RESET" button.

Note

This monitor is very sensitive, and if the adjustment of the glide path is not correct within small tolerances, the sensintrol relays in back of the front panel of the control unit will close. This will cause the horn on the upper left side of the rectifier power unit to blow and the "INCORR. COURSE" indicator to light. Reset the monitor sensintrol relays by means of the "MONITOR RESET" button on the front panel of the rectifier power unit. Another indication of fault is if the "PATH MONITOR" indicator on Radio Transmitter T-3/CRN-2 does not show the course-pointer on "PATH NORMAL".

(10) Equipment is turned off by depressing the "STOP" button on Power Unit PU-1/CRN-2.

b. FOR OPERATION FROM 60-CYCLE EXTERNAL MAINS.

(1) If the mains supply 110-120 or 220-240 volts at 60 cycles, pull out the "CONTROL UNIT" panel of Rectifier Power Unit PP-29/CRN-2 and set "LOCAL STRAPPING", on the lower left-hand side, for the correct voltage and frequency. Detail for setting the strapping is found on a plate on the control panel. Push the panel back in.

(2) Connect the external mains to terminals provided in the terminal box on the side of the rectifier power unit.

(3) Put "EXTERNAL MAINS — GAS GENERATOR" switch to "EXTERNAL MAINS" position. Set "REMOTE OPERATION — LOCAL OPERATION" switch to "LOCAL OPERATION".

(4) Continue as in paragraph 1a (4) to (10) this section.

(5) To stop the equipment, throw the "TRANS-MIT-OFF" switch found on the door of the rectifier

power unit to "OFF" position.

c. FOR OPERATION FROM 50-CYCLE EXTERNAL MAINS.

(1) If the mains supply 110-120 or 220-240 volts at 50 cycles, pull out the "CONTROL UNIT" panel of Rectifier Unit PP-29/CRN-2 and set "LOCAL STRAPPING", on the lower left-hand side, for correct voltage and frequency. Detail for setting the strapping is found on a plate on the panel. Push the panel control back in place.

(2) Connect the external mains to terminals provided in the terminal box on the side of the rectifier power unit.

(3) Connect the four numbered leads from Motor Generator PU-15/CRN-2 to the corresponding terminals in the junction box on the side of the rectifier power unit. Check the strapping of the generator and set the strapping for the voltage of the external mains.

(4) Place the "EXTERNAL MAINS—GAS GENERATOR"† switch in the "EXTERNAL" position. Set the "REMOTE OPERATION — LOCAL OPERATION" switch to "LOCAL OPERATION".

(5) Continue as in paragraph 1a(4) to (10) this section.

(6) To stop the equipment, throw the "TRANS-MIT-OFF" switch on the door of the rectifier power unit to "OFF" position.

2. OPERATION OF RADIO RECEIVER AND TRANSMITTER BC-659-(*).

This receiver and transmitter is part of Radio Set SCR-610-(A).

a. Turn the "VOLUME" control knob on all the way.

b. Turn the meter switch to "OPER."

c. Turn the channel selector control marked "CHAN" to the channel on which communication is to be made. Listen for the station with which communication is desired.

†Unless otherwise noted, all switches are found on the panel of Rectifier Power Unit PP-29/CRN-2.

*Any production is applicable.



Figure 3-2. Radio Set AN/CRN-2—Radio Transmitter T-3/CRN-2—Panel View

- d. Regulate the volume control to the desired level.
- e. To transmit, press the switch on the headset and speak clearly into the microphone. Release when trans-

- mission is complete.
- f. To turn off the radio set, turn "VOLUME" to the "OFF" position.

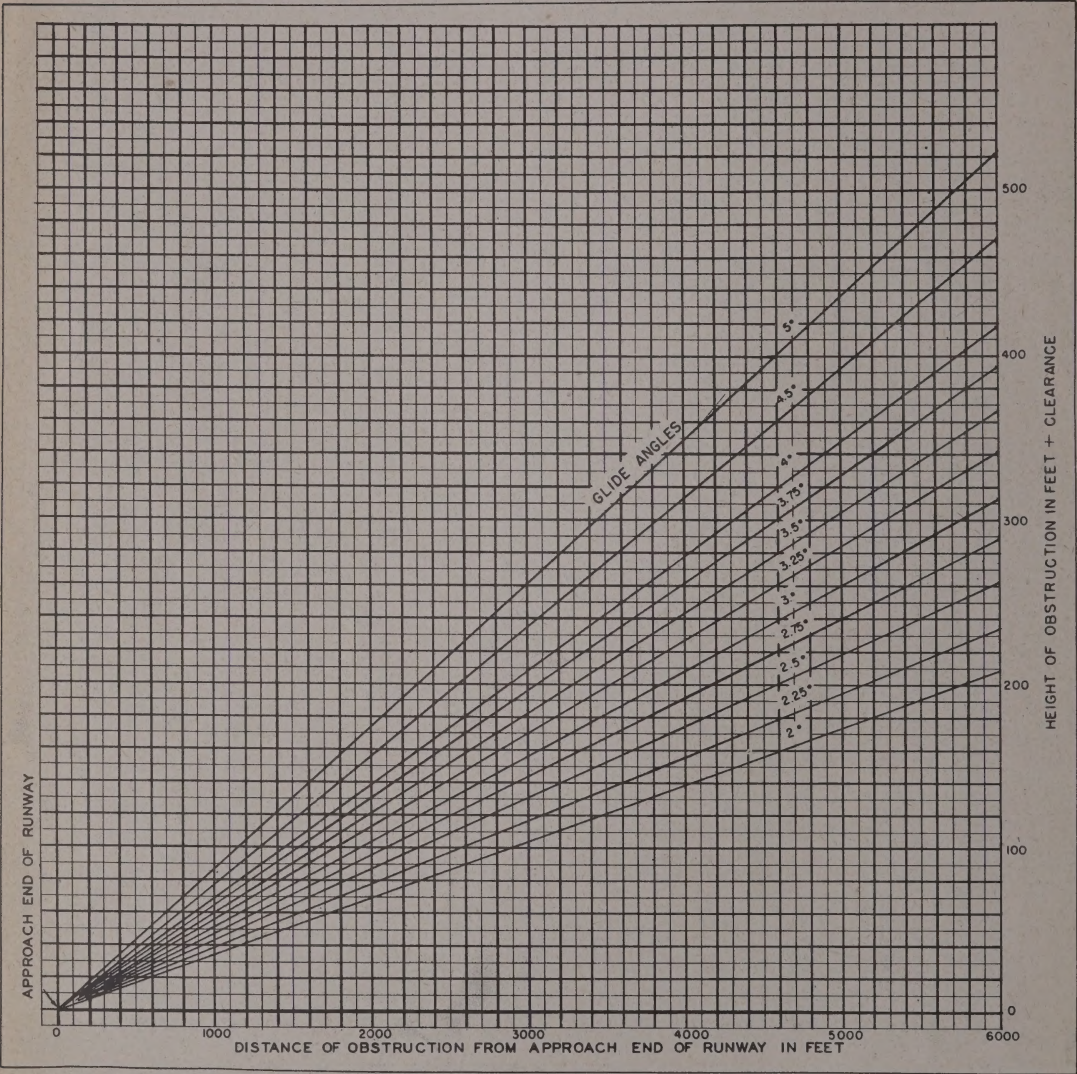


Figure 3-3. Radio Set AN/CRN-2—Determination of Glide Angle



Figure 3-2. Radio Set AN/CRN-2—Radio Transmitter T-3/CRN-2—Panel View

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- d. Regulate the volume control to the desired level.
e. To transmit, press the switch on the headset and speak clearly into the microphone. Release when trans-

mission is complete.

- f. To turn off the radio set, turn "VOLUME" to the "OFF" position.

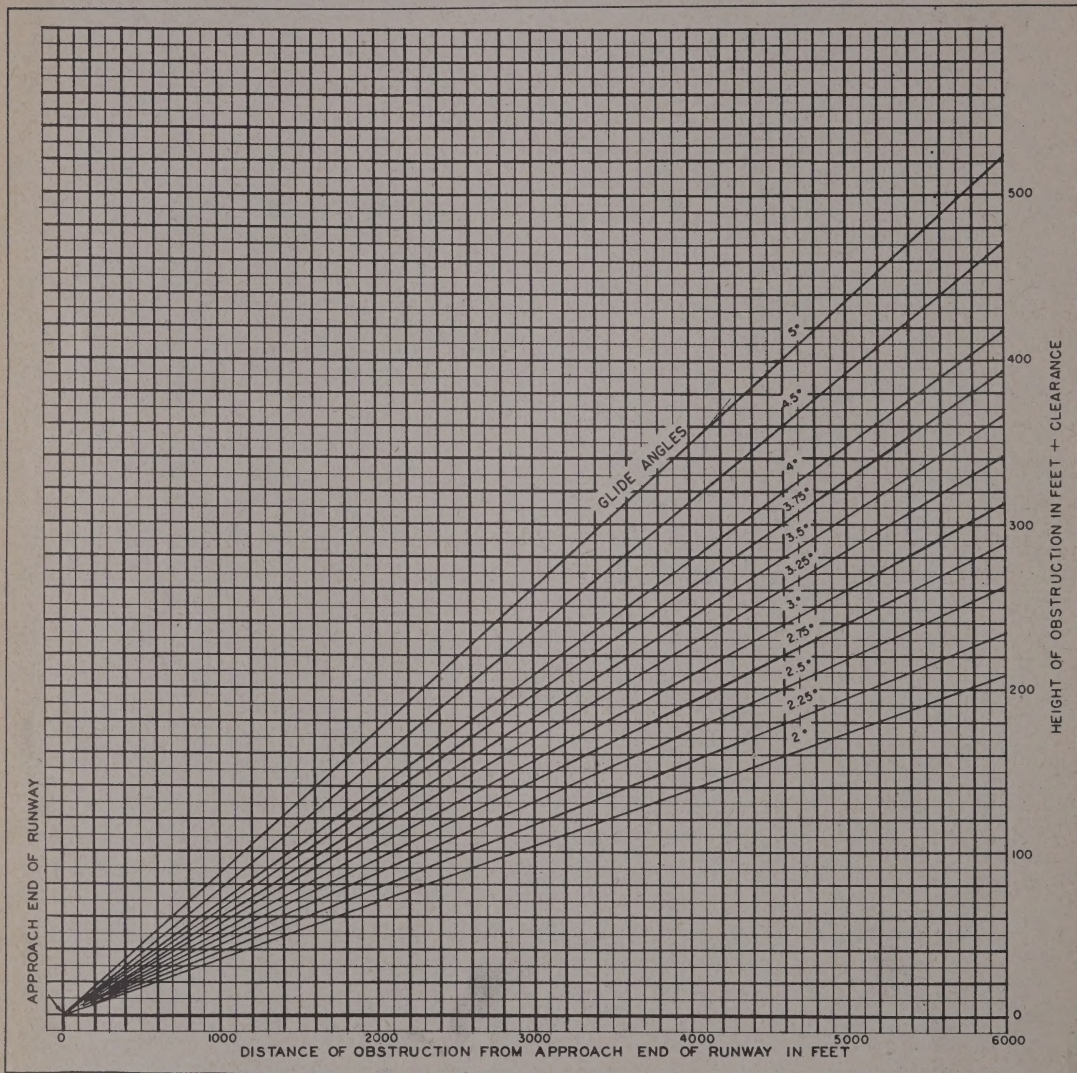


Figure 3-3. Radio Set AN/CRN-2—Determination of Glide Angle

SECTION IV

EMERGENCY OPERATIONS AND REPAIR

1. TUBE REPLACEMENT.

a. SPARE TUBES.—Replacements are found in the spare parts box on the back side of the trailer.

b. RECTIFIER POWER UNIT PP-29/CRN-2.—To check for defective tubes, unscrew the front panel. Pull out the chassis part way and turn up the louvre (lower half of the panel). The tubes are on the underside. Replace the tubes one at a time* with tubes known to be good.

c. RADIO TRANSMITTER T-3/CRN-2. — Remove the door of the chassis. Unscrew the front panel. Partially pull out the top, middle and bottom panels one at a time. The tubes are then exposed. Replace the tubes one at a time† with tubes known to be good. If tubes JAN-8025, located in the left-hand side of the "POWER OUTPUT UNIT" are replaced, they are to be neutralized as in paragraph 2, below.

2. NEUTRALIZATION.

If any of the power amplifier tubes (JAN-8025) are replaced, the power amplifier stage must be reneutralized as accurately as possible according to the following procedure.

CAUTION

If neutralization is not done properly the power amplifier tubes will be over-loaded and their life will be greatly shortened.

a. After installing the new tubes, loosen the lock nut on neutralizing capacitor 1310. *Do not change the adjustment of the capacitor.*

b. Replace the chassis and insert all the screws which hold it in place.

c. Tune the transmitter completely as described in section III, paragraph 1.

d. Set the "GRID CURRENT" switch to position "5".

e. Insert the neutralizing tool through the "NEUTRALIZE" hole in the panel until it engages the slot in the shaft of the neutralizing capacitor.

f. Turn the knob on the neutralizing tool very slowly, first in one direction, then in the other, until the "GRID C-PLATE V" meter indication is at maximum. Adjustment is very critical and very slight movement of the neutralizing tool will cause a large deflection of the meter. *Make sure the capacitor is adjusted to the exact maximum as indicated by the meter.*

g. Retune "JAN-8025 TRIP. PLATE" and "JAN-8025 P.A. PLATE" as described in section III, paragraph 1, then readjust the neutralizing control as before.

b. Remove the necessary screws, slide the chassis out, and tighten the lock nut on the neutralizing capacitor shaft. Use extreme care so that this adjustment is not changed.

i. Slide the chassis back and replace all the screws.

3. FUSE REPLACEMENT.

a. SPARE FUSES.—Replacements are found in the spare parts box on the back side of the trailer.

b. RECTIFIER POWER UNIT PP-29/CRN-2. — Fuses are located inside the top portion of the chassis of the power unit. A code for the fuses is available inside the chassis on the upper left-hand side.

*If it is necessary to replace Tubes JAN-836 (VT-236) both are to be replaced at the same time.

†Tubes JAN-8025 are to be replaced in pairs.

